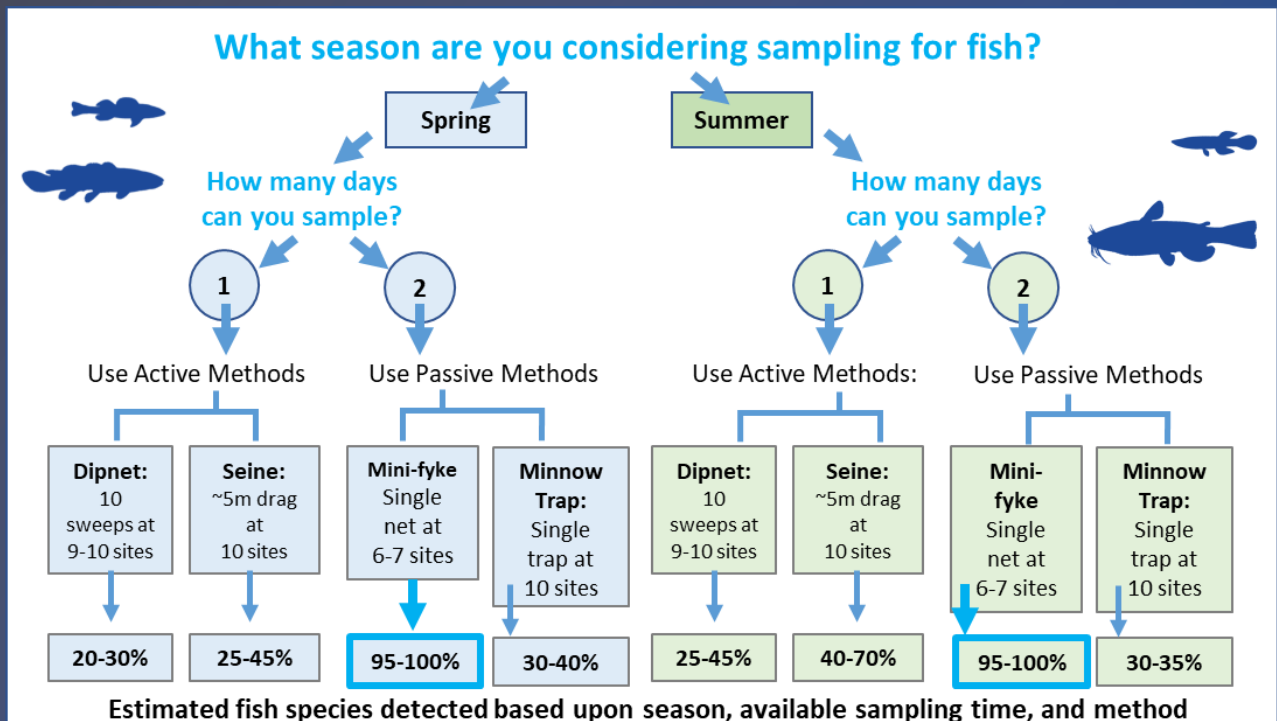
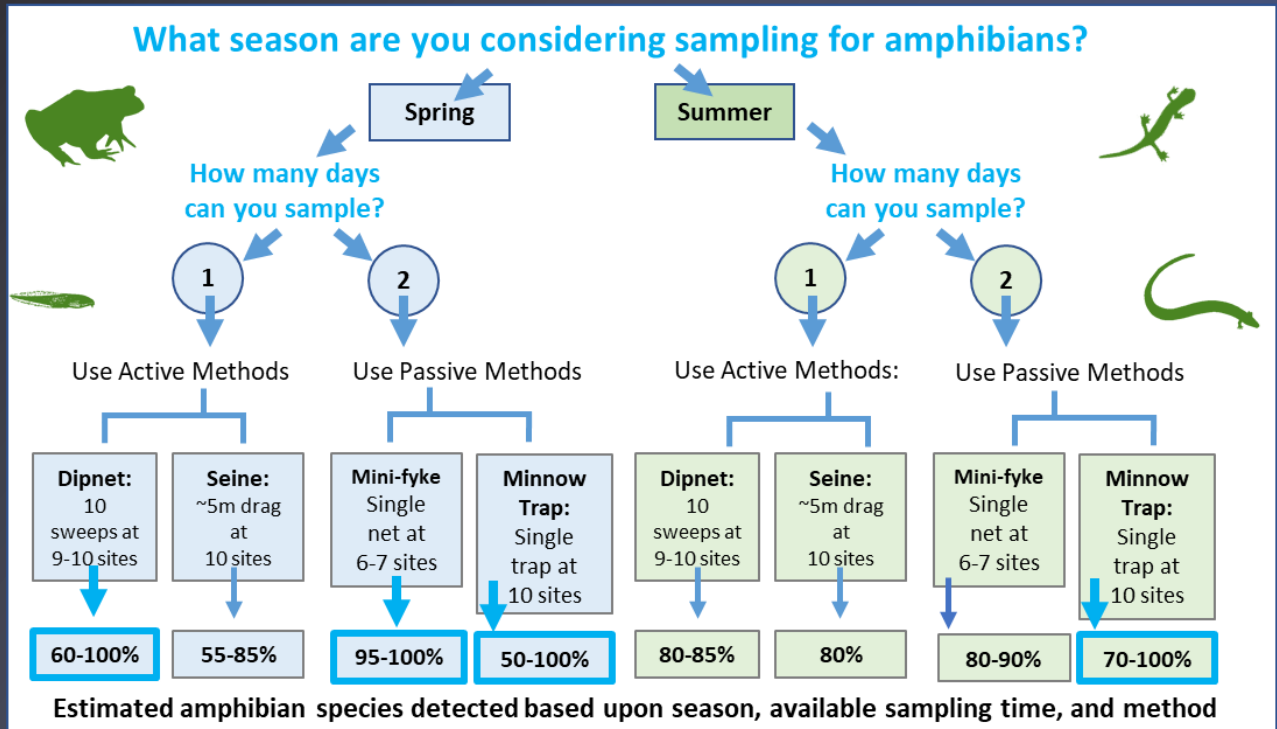




## Surveying Fish and Amphibians in Missouri Wetlands: Active vs Passive Methods



# Surveying Fish and Amphibians in Missouri Wetlands: Active vs Passive Methods

By: Julia G. Kamps, University of Missouri; Craig. P. Paukert, USGS Missouri Cooperative Research Unit; Elisabeth B. Webb, USGS Missouri Cooperative Research Unit; Frank Nelson, Missouri Department of Conservation

## Background Information:

Monitoring cryptic species, like fish and amphibians, helps reduce uncertainty and informs management decisions of a broader range of wetland dependent taxa. However, the time and effort required for monitoring are limited, so knowing the trade-offs of different survey methods, site selection, and timing can help managers determine best surveying practices based on monitoring objectives. The following guidelines are based on extensive sampling of 29 wetlands across three ecoregions in Missouri during 2015-2016. Sampling compared two active methods (dipnets and seines) and two passive methods (minnow traps and mini-fyke nets). See Kamps (2017) for detailed methods, results, and discussion.



A seine is an active gear suited for deeper locations.

## Comparison of Active and Passive Methods

- **Skill and repeatability:** Active methods rely on the equipment and the skill of the observer. Passive methods rely more on the design and efficacy of the net/trap.
- **Effort:** Active methods require constant operation over time. Passive methods are set and left overnight.
- **Man-power:** Active and passive methods may require 1 or 2 people. It's often easier to sample both methods with 2, with active sampling requiring 2.
- **Time:** Active methods can be done in a single day. Passive methods require setting nets on one day and checking them the next.
- **Species Selectivity (size and behavior):** Active methods tend to capture smaller, less mobile individuals. Passive methods will capture a larger range of individual sizes and may target nocturnal species and individuals that are in a mobile life history stage.
- **Habitat Constraints:** Overall, active methods may be limited to shallow open water settings as vegetation and deeper water restrict observer mobility and reduce method efficiency. Passive methods can be set in or along the edge of vegetation. Adjustments can be made to passive methods to account for deeper water but require a minimum water depth to submerge trap openings.

- **Affordability:** Method costs vary.
  - Dipnet cost ~\$45
  - Seine cost ~\$80
  - Minnow trap ~\$30
  - Mini-fyke net ~\$350

## Survey Site Selection:

- **Distance from Shore:** Fish were more frequently detected closer to shore.
- **Water Depth:** Amphibians were detected in greater numbers in shallower depths with most methods.
- **Vegetation:** Mesh components of active methods can snag on suspended plant debris and erect vegetation or clog with algae, enabling individuals to escape.

**Sampling Timing:** Timing of sample collection depends on monitoring objectives. Amphibians that use wetlands for reproduction or during specific life history stages may be more detectable at specific times of the year. Likewise, fish species may have a greater likelihood of being detected during or after a flood due to connection with adjacent rivers or streams.

## Sampling Method Strengths:

- **Minnow Traps:** Are affordable and catch unique amphibians, even in vegetation.
- **Dip nets:** Are cheap, quick, and easy to use by one person in shallow water without thick vegetation. They may also detect unique amphibians.
- **Seines:** Can quickly catch fish in deeper water habitats that is still wadeable.
- **Mini-fykes:** Can catch a wide range of fish and amphibian species in high numbers, including unique fish species.

**Species Identification:** Using field guides and documenting species with photographs is a good first step. Monitoring provides an opportunity for biologists to collaborate outside their expertise.



A mini-fyke net is a passive gear checked after leaving it overnight.

**Implications:** Identifying a project's objectives are first and foremost. Once this has been decided, there are a series of trade-offs to consider when selecting appropriate and efficient methodologies for sampling fish and amphibians. The findings of this study should help inform this process.

For more information, contact:

Missouri Department of Conservation  
Resource Science Division  
2901 West Truman Blvd.  
Jefferson City, MO 65109  
573-751-4115  
[research@mdc.mo.gov](mailto:research@mdc.mo.gov)

**Keywords:** wetland sampling, monitoring, fish, amphibians